

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 809 365 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
01.12.1999 Bulletin 1999/48

(51) Int Cl.⁶: **H04B 7/005, H04Q 7/38**

(21) Application number: **97108298.7**

(22) Date of filing: **22.05.1997**

(54) Scheme for controlling transmission powers during soft handover in a cdma mobile communication system

Schema zur Steuerung der Sendeleitungen während des sanften Weiterreichens in einem CDMA-Mobilfunkkommunikationssystem

Commande des puissances pendant la commutation douce dans un système de communication mobile à accès multiple par division de code

(84) Designated Contracting States:
DE FR GB IT SE

(30) Priority: **22.05.1996 JP 12738396**

(43) Date of publication of application:
26.11.1997 Bulletin 1997/48

(73) Proprietor: **NTT MOBILE COMMUNICATIONS
NETWORK INC.
Minato-ku, Tokyo (JP)**

(72) Inventors:
• **Nakamura, Takehiro
Yokosuka-shi, Kanagawa (JP)**

• **Ohno, Kouji
Yokohama-shi, Kanagawa (JP)**
• **Nakano, Etsuhiro
Yokosuka-shi, Kanagawa (JP)**

(74) Representative:
**von Fischern, Bernhard, Dipl.-Ing. et al
Hoffmann - Eitle,
Patent- und Rechtsanwälte,
Arabellastrasse 4
81925 München (DE)**

(56) References cited:
**EP-A- 0 671 819 EP-A- 0 680 160
WO-A-95/08901**

EP 0 809 365 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] The present invention relates to a transmission power control scheme for a CDMA (Code Division Multiple Access) mobile communication system, and more particularly, to a scheme for controlling transmission powers during a soft handover in which a mobile station is simultaneously connected with a plurality of base stations in the CDMA mobile communication system, for the purpose of making a receiving quality of a reference radio channel equal to a prescribed receiving quality,

DESCRIPTION OF THE BACKGROUND ART

[0002] In order to increase the radio channel capacity (the maximum number of simultaneous communications) in the CDMA mobile communication system, there is a need to control transmission powers so that the receiving qualities of all the radio channels are always set equal to each other.

[0003] On the other hand, in the transmission power control during the soft handover in which a mobile station is simultaneously connected with a plurality of base stations, the transmission power can be further reduced by carrying out a transmission power control for setting a receiving quality of a radio channel with the best radio channel quality (which will be referred to as a reference radio channel hereafter) equal to a prescribed reference quality (see EP-A-0 680 160 for detail).

[0004] In the soft handover, a plurality of base stations are connected with a combining station via wire transmission lines, where a plurality of upward transmission signals from these base stations to the combining station are selectively combined at a prescribed selective combination interval at the combining station while a plurality of downward transmission signals from these base stations to the mobile station are selectively combined at a prescribed selective combination interval at the mobile station.

[0005] When the above mentioned conventional transmission power control method disclosed in Japanese Patent Application No. 7-77934 is applied to such a soft handover using the selective combination, there arises a problem that the radio channel quality after the selective combination becomes lower than the reference quality.

[0006] Namely, from a viewpoint of the radio channel capacity, there is a need to set the transmission power control interval to be an extremely short period of time such as 1 msec, for example. On the other hand, from a viewpoint of the transmission traffic for the reliability information, it is quite difficult to set the selective combination interval equal to the transmission power control interval, and therefore the selective combination interval

is set to be longer than the transmission power control interval.

[0007] Fig. 1 shows an exemplary variation in time of a receiving SIR (Signal to Interference Ratio), which is a ratio of a desired signal receiving level and an interference receiving level at each base station, for a case of using a constant maximum transmission power without the transmission power control and for a case of carrying out the conventional transmission power control.

[0008] As shown in Fig. 1, for a frame A section, when the transmission power control is OFF, the receiving SIR for a base station BS2 as indicated by a dashed line is higher so that a radio channel of this base station BS2 becomes the reference radio channel. Consequently, when the transmission power control is ON, the receiving SIR of this base station BS2 is controlled to be equal to a reference SIR so that the base station BS2 always satisfies the reference SIR. At the same time, the receiving SIR of a base station BS1 as indicated by a solid line is also controlled to be smaller as much as the receiving SIR of the base station BS2 is made smaller. As should be apparent, at a time of the selective combination for the frame A, the received frame of the base station BS2 will be selected so that the reference SIR can be satisfied even after the selective combination.

[0009] In contrast, for a frame B section, in a section B₁ up to a middle, the receiving SIR for the base station BS2 as indicated by a dashed line is higher so that the radio channel of the base station BS2 becomes the reference radio channel when the transmission power control is OFF. Consequently, when the transmission power control is ON, and consequently the receiving SIR of the base station BS2 is controlled to be equal to the reference SIR so that the base station BS2 satisfies the reference SIR while the receiving SIR of the base station BS1 is lower than the reference SIR.

[0010] Then, the receiving SIR of the base station BS1 becomes higher than that of the base station BS2 in a section B₂ from a middle. Here, the transmission power control interval is shorter than the frame length so that the radio channel of the base station BS1 becomes the reference radio channel from this middle point on as the receiving SIR of the base station BS1 as indicated by a solid line becomes higher from this middle point on when the transmission power control is OFF. Consequently, when the transmission power control is ON, the receiving SIR of this base station BS1 is controlled to be equal to the reference SIR so that the base station BS1 satisfies the reference SIR while the receiving SIR of the base station BS2 becomes lower than the reference SIR.

[0011] In an example shown in Fig. 1, the average SIR in the frame B section is higher for the base station BS2, so that the received frame of the base station BS2 will be selected at a time of the selective combination, but the average receiving SIR of the base station BS2 for the frame B becomes lower than the reference SIR because the receiving SIR of the base station BS2 is de-

graded in the section B₂.

[0012] Thus, there has been a problem that the communication quality becomes lower than the reference SIR after the selective combination for the frame B.

[0013] In other words, when the conventional transmission power control method of EP-A-0 680 160 is applied to the soft handover using the selective combination, there has been a problem that the communication quality after the selective combination cannot satisfy the reference quality at such a selective combination section in which a relationship between the receiving qualities of the base stations is reversed, because the transmission power control interval is shorter than the selective combination interval.

[0014] In particular, when the fading frequency is higher, a relationship between the receiving qualities of the base stations will be reversed more frequently within the selective combination interval, and therefore a degradation of the communication quality after the selective combination is expected to be even worse, but such a severe degradation of the communication quality is intolerable from a viewpoint of the service quality.

[0015] In addition, for the purpose of the selective combination at the combining station, the data transmission from a plurality of base stations to the combining station via a plurality of wire transmission lines is required, so that there has also been a problem concerning the increase of the wire transmission line traffic, which in turn causes the increase of the wire transmission line cost.

[0016] WO 95/08901 describes a method for making a handover in a CDMA cellular radio system wherein different units of the system transmit to a mobile station using a different spreading code. Independent receiving units are used for receiving and demodulating each of these signals. Accordingly, base stations do not have synchronized with each any longer and a handover can be simplified. However, a controlling of transmission powers during a handover is not described.

Summary of the invention

[0017] It is therefore an object of the present invention to provide a scheme for controlling transmission powers during a soft handover in a CDMA mobile communication system, in which the receiving quality can always satisfy the reference quality even when a relationship between the receiving qualities of the base stations is reversed within the selective combination interval.

[0018] According to one aspect of the present invention there is provided a method for controlling transmission powers during a soft handover in a CDMA mobile communication system where a mobile station is simultaneously connected with a plurality of base stations via a plurality of radio channels while said plurality of base stations is connected with a combining station via a plurality of wire transmission lines so that a plurality of transmission signals from said plurality of base stations

to the combining station is selectively combined at a prescribed selective combination interval by the combining station and a plurality of transmission signals from said plurality of base stations to the mobile station is selectively combined at the prescribed selective combination interval by the mobile station, the method comprising the steps of: selecting one radio channel among said plurality of radio channels as a reference radio channel for a prescribed selective combination interval; maintaining the selected one radio channel as the reference radio channel, even if during the prescribed selective combination interval the receiving quality of another radio channel becomes better than the receiving quality of the radio channel selected as reference radio channel; and carrying out a transmission power control for a prescribed transmission power control interval within the prescribed selective combination interval, so that a receiving quality of the reference radio channel satisfies a prescribed reference quality.

[0019] According to another aspect of the invention there is provided a CDMA mobile communication system comprising a mobile station, a plurality of base stations, and a combining station, where the mobile station during a soft handover is simultaneously connected with a plurality of base stations via a plurality of radio channels while said plurality of base stations are connected with a combining station via a plurality of wire transmission lines so that a plurality of transmission signals from said plurality of base stations to the combining station are selectively combined at a prescribed selective combination interval by the combining station and a plurality of transmission signals from said plurality of base stations to the mobile station are selectively combined at the prescribed selective combination interval by the mobile station, wherein the mobile station includes: a selection unit for selecting one radio channel among said plurality of radio channels as a reference radio channel for a prescribed selective combination interval and maintaining the selected one radio channel as the reference radio channel, even if during the prescribed selective combination interval the receiving quality of another radio channel becomes better than the receiving quality of the radio channel selected as reference radio channel; and a control unit for carrying out a transmission power control for a prescribed transmission power control interval within the prescribed selective combination interval so that a receiving quality of the reference radio channel satisfies a prescribed reference quality.

[0020] Other features and advantages of the present invention will become apparent from the following description taken in conjunction with the accompanying drawings.

Brief description of the drawings

[0021] Fig. 1 is a graph showing an exemplary variation in time of a receiving SIR for a case of using a constant maximum transmission power without the trans-

mission power control and for a case of carrying out the conventional transmission power control.

[0022] Fig. 2 is a schematic block diagram of an exemplary CDMA mobile communication system for realizing the transmission power control scheme according to the present invention.

[0023] Fig. 3 is a block diagram showing an internal configuration of a mobile station in the CDMA mobile communication system of Fig. 2.

[0024] Fig. 4 is a block diagram showing an internal configuration of each base station in the CDMA mobile communication system of Fig. 2.

[0025] Fig. 5 is a graph showing an exemplary variation in time of a receiving SIR for a case of using a constant maximum transmission power without the transmission power control and for a case of carrying out the transmission power control according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Referring now to Fig. 2 to Fig. 5, the preferred embodiments of the transmission power control scheme according to the present invention will be described in detail.

[0027] Fig. 2 shows a schematic configuration of an exemplary CDMA mobile communication system for realizing the transmission power control scheme according to the present invention, which comprises a mobile station MS, two base stations BS1 and BS2, and a combining station CS.

[0028] In this CDMA mobile communication system of Fig. 2, the mobile station MS is in a process of the soft handover and receiving a downlink radio channel 91 from the base station BS1 and a downlink radio channel 93 from the base station BS2 while transmitting a common uplink radio channel 95 to the base stations BS1 and BS2. In addition, the base station BS1 is connected with the combining station CS through a wire transmission line 97 and the base station BS2 is connected with the combining station CS through a wire transmission line 99.

[0029] Fig. 3 shows a configuration of the mobile station MS in the CDMA mobile communication system of Fig. 2, which comprises an antenna 10, a duplexer 11, a reception radio unit 12, despreading units 13 and 13', demodulation units 14 and 14', a transmission power control information extraction unit 15, a transmission power control information selection unit 16, a transmission power control unit 17, desired signal receiving power detection units 19 and 19', interference receiving power detection units 20 and 20', a first type SIR calculation unit 20 for calculating an SIR per a transmission power control interval, an SIR selection unit 21, a transmission power control information determining unit 22, a signal generation unit 23, a modulation unit 24, a spreading unit 25, a transmission radio unit 26, a second

type SIR extraction unit 27 for extracting an SIR immediately before a unit of selective combination from the received signals, and a second type SIR calculation units 28 and 28' for calculating an SIR immediately before a unit of selective combination. The functions of these elements of the mobile station MS will be described in detail below.

[0030] Fig. 4 shows a configuration of each base station BS (BS1 or BS2) in the CDMA mobile communication system of Fig. 2, which comprises an antenna 63, a duplexer 31, a transmission radio unit 33, a spreading unit 35, a modulation unit 37, a signal generation unit 39, a transmission power control unit 41, a transmission power control information extraction unit 43, a transmission power control information determining unit 45, a combining station interface 47, a reception radio unit 49, a despreading unit 51, a desired signal receiving power detection unit 53, an interference receiving power detection unit 55, a demodulation unit 57, a first type SIR calculation unit 59 for calculating an SIR per a transmission power control interval, a second type SIR calculation unit 61 for calculating an SIR immediately before a unit of selective combination, a transmission data extraction unit 65, a reference radio channel specifying information extraction unit 67, and a wire transmission judgement unit 69. The functions of these elements of the base station BS will be described in detail below.

[0031] In the CDMA mobile communication system of Fig. 2, the mobile station MS and the base station BS which are in communication will carry out the transmission power control at a prescribed transmission power control interval so that the receiving qualities of the respective radio channels become equal to a prescribed reference quality. In addition, during the soft handover in which the mobile station MS is simultaneously connected with a plurality (two in this embodiment) of base stations BS1 and BS2 as indicated in Fig. 2, the base stations BS1 and BS2 are connected with the combining station CS through the respective wire transmission lines 97 and 99 so that the transmission signals from the base stations BS1 and BS2 to the combining station CS are selectively combined at the combining station CS at a prescribed selective combination interval, while the transmission signals from the base stations BS1 and BS2 to the mobile station MS are selectively combined at the mobile station MS at a prescribed selective combination interval.

[0032] Now, in the first embodiment of the transmission power control scheme according to the present invention, the CDMA mobile communication system of Fig. 2 is operated as follows.

[0033] At each one of the base stations BS1 and BS2, the uplink radio channel from the mobile station MS is received by the antenna 63, and the received signals are entered into the reception radio unit 49 through the duplexer 31. These received signals are then subjected to a processing such as a removal of components outside the bandwidth, an amplification, a frequency con-

version to an intermediate frequency band, a detection, and an A/D conversion at the reception radio unit 49, and then entered into the despreading unit 51. These received signals are then despread by the despreading unit 51, while the desired signal receiving power and the interference receiving power are measured whenever necessary by the desired signal receiving power detection unit 53 and the interference receiving power detection unit 55, respectively.

[0034] These measured desired signal receiving power and interference receiving power are then supplied to the first type SIR calculation unit 59, where the SIR value is calculated at a prescribed timing in each transmission power control interval, and the calculated SIR value is supplied to the transmission power control information determining unit 45.

[0035] At the transmission power control information determining unit 45, the entered SIR value is compared with a prescribed reference SIR value. When the entered SIR value is greater than or equal to the prescribed reference SIR value, it is decided that the transmission power control information should be "lower the upward transmission power", whereas when the entered SIR value is less than the prescribed reference SIR value, it is decided that the transmission power control information should be "raise the upward transmission power". This decision is then notified to the signal generation unit 39.

[0036] The signal generation unit 39 then generates the transmission power control information to be set to the downlink radio channel according to the decision notified from the transmission power control information determining unit 45, and constructs transmission frames for the downlink radio channel by using the generated transmission power control information and the downward transmission data given from the combining station interface 47.

[0037] The transmission frames are then modulated by the modulation unit 37, spread by the spreading unit 35, and subjected to a processing such as a D/A conversion, a frequency conversion and an amplification at the transmission radio unit 33. The transmission frames are then transmitted to the mobile station MS from the antenna 63 through the duplexer 31.

[0038] On the other hand, at the mobile station MS in a process of the soft handover which is in communication with a plurality of base stations BS1 and BS2, a plurality of downward signals from the base stations BS1 and BS2 are collectively received by the antenna 10, and entered into the reception radio unit 12 through the duplexer 11. These collectively entered plurality of downward signals are then subjected to a processing such as a removal of components outside the bandwidth, an amplification, a frequency conversion to an intermediate frequency band, a detection, and an A/D conversion at the reception radio unit 12. These downward signals for two radio channels are then distributed to the despreading units 13 and 13'.

[0039] These downward signals from two base stations BS1 and BS2 are then separately despread by using the respective spread codes at the despreading units 13 and 13', and the despread signals for two radio channels are then entered into the demodulation units 14 and 14' respectively. The demodulation units 14 and 14' demodulate the respective despread signals for the respective radio channels, and supply these demodulated signals for two radio channels to the transmission power control information extraction unit 15. The transmission power control information extraction unit 15 then extracts two transmission power control informations from the supplied demodulated signals for two radio channels, and supplies these two extracted transmission power control informations to the transmission power control information selection unit 16.

[0040] The transmission power control information selection unit 16 selects one transmission power control information which is continually commanding the lowering of the transmission power for the longest period of time prior to the transmission power control information immediately before the current unit of selective combination among these two entered transmission power control informations. Then, only the transmission power control received from one base station which transmitted that selected transmission power control information is supplied to the transmission power control unit 17 during the current unit of selective combination. This processing is carried out at every selective combination interval.

[0041] The transmission power control unit 17 determines the transmission power value at the transmission power control interval so as to raise or lower the transmission power by a prescribed value according to the entered transmission power control information, and notifies the determined transmission power value to the transmission radio unit 26. At the transmission radio unit 26, the upward transmission signals given from the spreading unit 25 are subjected to a processing such as a D/A conversion, a frequency conversion, and an amplification according to the transmission power value notified from the transmission power control unit 17, and then transmitted to the base stations BS1 and BS2 from the antenna 10 through the duplexer 11.

[0042] In this first embodiment, the radio channel which is continually commanding the lowering of the transmission power for the longest period of time prior to the transmission power control information immediately before the current unit of selective combination is set as the reference radio channel for the current unit of selective combination. Namely, the mobile station in a process of the soft handover sets the radio channel which has the best receiving quality immediately before each unit of selective combination among a plurality of radio channels as the reference radio channel for each unit of selective combination and carries out the transmission power control so that the receiving SIR of this reference radio channel becomes equal to the pre-

scribed reference SIR.

[0043] In an exemplary case shown in Fig. 5, for a unit of selective combination B, the radio channel of the base station BS2 which has the best receiving SIR immediately before this unit of selective combination B is set as the reference radio channel, and even when the receiving SIR of the base station BS1 becomes better than that of the base station BS2 during this unit of selective combination B as indicated in Fig. 5, the reference radio channel is maintained within this unit of selective combination B, so that the prescribed reference quality can be satisfied by the reference radio channel within the unit of selective combination.

[0044] Note here that, in an exemplary case shown in Fig. 5, the receiving SIR of the base station BS1 slightly exceeds the reference SIR at the section B2 of the unit of selective combination B and this causes the interference so that the capacity is slightly reduced, but this reduction of the capacity is so slight that it hardly causes any practical problem.

[0045] Next, in the second embodiment of the transmission power control scheme according to the present invention, the CDMA mobile communication system of Fig. 2 is operated as follows.

[0046] In this second embodiment, the mobile station MS is in a process of the soft handover where the mobile station MS is simultaneously connected with two base stations BS1 and BS2, a plurality of downward signals from the base stations BS1 and BS2 are collectively received by the antenna 10, and entered into the reception radio unit 12 through the duplexer 11. These collectively entered plurality of downward signals are then subjected to a processing such as a removal of components outside the bandwidth, an amplification, a frequency conversion to an intermediate frequency band, a detection, and an A/D conversion at the reception radio unit 12. These downward signals for two radio channels are then distributed to the despreading units 13 and 13', and separately despread by using the respective spread codes at the despreading units 13 and 13'.

[0047] In addition, at the despreading units 13 and 13', the desired signal receiving power and the interference receiving power of the received signals for each radio channel are measured whenever necessary by the desired signal receiving power detection units 18 and 18' and the interference receiving power detection units 19 and 19' respectively, and the measured receiving power values for each radio channel are supplied to the first type SIR calculation units 20 and 20' and the second type SIR calculation units 28 and 28' respectively. The first type SIR calculation units 20 and 20' respectively calculate the SIR values for respective radio channels at a prescribed timing in each transmission power control interval according to the measured receiving power values and supply the calculated SIR values for two radio channels to the SIR selection unit 21. The second type SIR calculation units 28 and 28' respectively calculate the SIR values for respective radio channels imme-

diately before a unit of selective combination according to the measured receiving power values and supply the calculated SIR values for two radio channels to the SIR selection unit 21.

[0048] The SIR selection unit 21 selects the downlink radio channel with the best receiving SIR immediately before a unit of selective combination among those supplied from the second type SIR calculation units 28 and 28' as the reference radio channel for the current unit of selective combination, while selecting the SIR value supplied from one of the first type SIR calculation units 20 and 20' corresponding to the reference radio channel for the current unit of selective combination, and supplying the selected SIR value to the transmission power control information determining unit 22. In this case, the SIR value supplied from the other one of the first type SIR calculation units 20 and 20' corresponding to the other radio channel which is not the reference radio channel for the current unit of selective combination will be discarded at the SIR selection unit 21. This processing is carried out at every selective combination interval.

[0049] At the transmission power control information determining unit 22, the entered SIR value is compared with a prescribed reference SIR value. When the entered SIR value is greater than or equal to the prescribed reference SIR value, it is decided that the transmission power control information should be "lower the downward transmission power", whereas when the entered SIR value is less than the prescribed reference SIR value, it is decided that the transmission power control information should be "raise the downward transmission power". This decision is then notified to the signal generation unit 23.

[0050] The signal generation unit 23 then generates the transmission power control information to be set to the uplink radio channel according to the decision notified from the transmission power control information determining unit 22, and constructs transmission frames for the uplink radio channel by using the generated transmission power control information.

[0051] The transmission frames are then modulated by the modulation unit 24, spread by the spreading unit 25, and subjected to a processing such as a D/A conversion, a frequency conversion and an amplification at the transmission radio unit 26. The transmission frames are then transmitted to a plurality of base stations BS1 and BS2 from the antenna 10 through the duplexer 11.

[0052] On the other hand, at each base station BS, the upward signal from the mobile station MS is received by the antenna 63, and entered into the reception radio unit 49 through the duplexer 31. The received upward signal is then subjected to a processing such as a removal of components outside the bandwidth, an amplification, a frequency conversion to an intermediate frequency band, a detection, and an A/D conversion at the reception radio unit 49, and then entered into the despreading unit 51.

[0053] The despreading unit 51 despreads the re-

ceived upward signal and supplies the despread signal into the demodulation unit 57. The demodulation unit 57 demodulates the despread signal and supplies the demodulated signal into the transmission power control information extraction unit 43 and the combining station interface 47. The combining station interface 47 then transmits the user data to the combining station CS through a wire transmission line 97 or 99.

[0054] The transmission power control information extraction unit 43 extracts the transmission power control information from the demodulated signal supplied by the demodulation unit 57 at each transmission power control interval, and supplies the extracted transmission power control information to the transmission power control unit 41. The transmission power control unit 41 determines the transmission power value at the transmission power control interval so as to raise or lower the transmission power by a prescribed value according to the entered transmission power control information, and notifies the determined transmission power value to the transmission radio unit 33.

[0055] At the transmission radio unit 33, the downward transmission signals given from the spreading unit 35 are subjected to a processing such as a D/A conversion, a frequency conversion, and an amplification according to the transmission power value notified from the transmission power control unit 41, and then transmitted to the mobile station MS from the antenna 63 through the duplexer 31.

[0056] Next, in the third embodiment of the transmission power control scheme according to the present invention, the CDMA mobile communication system of Fig. 2 is operated as follows.

[0057] In this third embodiment, during the soft handover in which the mobile station MS is simultaneously connected with a plurality of base stations BS1 and BS2, each base station BS receives the uplink radio channel from the mobile station MS at the antenna 63, and the received signals are entered into the reception radio unit 49 through the duplexer 31. These received signals are then subjected to a processing such as a removal of components outside the bandwidth, an amplification, a frequency conversion to an intermediate frequency band, a detection, and an A/D conversion at the reception radio unit 49, and then entered into the despreading unit 51. These received signals are then despread by the despreading unit 51, while the desired signal receiving power and the interference receiving power are measured whenever necessary by the desired signal receiving power detection unit 53 and the interference receiving power detection unit 55, respectively.

[0058] These measured desired signal receiving power and interference receiving power are then supplied to the first type SIR calculation unit 59 and the second type SIR calculation unit 63. The first type SIR calculation unit 59 calculates the SIR value at a prescribed timing in each transmission power control interval accord-

ing to the measured receiving power values and supplies the calculated SIR value to the transmission power control information determining unit 45. The second type SIR calculation unit 63 calculates the SIR value immediately before a unit of selective combination according to the measured receiving power values and supply the calculated SIR value to the signal generation unit 39.

[0059] At the transmission power control information determining unit 45, the entered SIR value is compared with a prescribed reference SIR value. When the entered SIR value is greater than or equal to the prescribed reference SIR value, it is decided that the transmission power control information should be "lower the upward transmission power", whereas when the entered SIR value is less than the prescribed reference SIR value, it is decided that the transmission power control information should be "raise the upward transmission power". This decision is then notified to the signal generation unit 39.

[0060] The signal generation unit 39 then generates the transmission power control information to be set to the downlink radio channel according to the decision notified from the transmission power control information determining unit 45, and constructs transmission frames for the downlink radio channel by using the generated transmission power control information, the downward transmission data given from the combining station interface 47, and the SIR value supplied from the second type SIR calculation unit 61.

[0061] The transmission frames are then modulated by the modulation unit 37, spread by the spreading unit 35, and subjected to a processing such as a D/A conversion, a frequency conversion and an amplification at the transmission radio unit 33. The transmission frames are then transmitted to the mobile station MS from the antenna 63 through the duplexer 31.

[0062] On the other hand, at the mobile station MS, a plurality of downward signals from the base stations BS1 and BS2 are collectively received by the antenna 10, and entered into the reception radio unit 12 through the duplexer 11. These collectively entered plurality of downward signals are then subjected to a processing such as a removal of components outside the bandwidth, an amplification, a frequency conversion to an intermediate frequency band, a detection, and an A/D conversion at the reception radio unit 12. These downward signals for two radio channels are then distributed to the despreading units 13 and 13'.

[0063] These downward signals from two base stations BS1 and BS2 are then separately despread by using the respective spread codes at the despreading units 13 and 13', and the despread signals for two radio channels are then entered into the demodulation units 14 and 14' respectively. The demodulation units 14 and 14' demodulate the respective despread signals for the respective radio channels, and supply these demodulated signals for two radio channels to the transmission power control information extraction unit 15 and the sec-

ond type SIR extraction unit 27.

[0064] The transmission power control information extraction unit 15 then extracts two transmission power control informations from the supplied demodulated signals for two radio channels at each transmission power control interval, and supplies these two extracted transmission power control informations to the transmission power control information selection unit 16. The second type SIR extraction unit 27 extracts two SIR values immediately before a unit of selective combination measured by the base stations from the supplied demodulated signals for two radio channels at each selective combination interval, and supplies these two SIR values to the transmission power control information selection unit 16.

[0065] The transmission power control information selection unit 16 selects the uplink radio channel with the best SIR immediately before a unit of selective combination among those supplied from the second type SIR extraction unit 27 as the reference radio channel for the current unit of selective combination, while selecting the transmission power control information supplied from the transmission power control information extraction unit 15 which is corresponding to the reference radio channel for the current unit of selective combination, and supplying the selected transmission power control information to the transmission power control unit 17. In this case, the transmission power control information corresponding to the other radio channel which is not the reference radio channel for the current unit of selective combination will be discarded at the transmission power control information selection unit 15. This processing is carried out at every selective combination interval.

[0066] The transmission power control unit 17 determines the transmission power value at the transmission power control interval so as to raise or lower the transmission power by a prescribed value according to the transmission power control information supplied from the transmission power control information selection unit 16, and notifies the determined transmission power value to the transmission radio unit 26. At the transmission radio unit 26, the upward transmission signals given from the spreading unit 25 are subjected to a processing such as a D/A conversion, a frequency conversion, and an amplification according to the transmission power value notified from the transmission power control unit 17, and then transmitted to the base stations BS1 and BS2 from the antenna 10 through the duplexer 11.

[0067] Next, in the fourth embodiment of the transmission power control scheme according to the present invention, the CDMA mobile communication system of Fig. 2 is operated as follows.

[0068] In this fourth embodiment, when the reference radio channel is determined for each unit of selective combination by the transmission power control information selection unit 16 of the mobile station MS, a refer-

ence radio channel specifying information which is specifying this determined reference radio channel for each unit of selective combination is supplied to the signal generation unit 23. At the signal generation unit 23, this reference radio channel specifying information is included into the transmission signals which includes the transmission power control information supplied from the transmission power control information determining unit 22, and the transmission signals are supplied to the modulation unit 24. These transmission signals containing the reference radio channel specifying information are then demodulated by the demodulation unit 24, spread by the spreading unit 25, and transmitted to the base stations BS1 and BS2 through the transmission radio unit 26, the duplexer 11 and the antenna 10.

[0069] On the other hand, each base station BS receives the transmission signals from the mobile station MS at the antenna 63, and the received signals are entered into the reception radio unit 49 through the duplexer 31. These received signals are then despread by the despread unit 51, and demodulated by the demodulation unit 57. From these demodulated signals, the transmission data and the reference radio channel specifying information are separately extracted at each unit of selective combination by the transmission data extraction unit 65 and the reference radio channel specifying information extraction unit 67, and supplied to the wire transmission judgement unit 69.

[0070] The wire transmission judgement unit 69 then judges whether the reference radio channel specifying information in the current unit of selective combination indicates a radio channel of the own station or not, and when it indicates a radio channel of the own station, transmits the transmission data contained in the current unit of selective combination to the combining station CS through the combining station interface 47 and the wire transmission line 97 or 99.

[0071] Also, at the wire transmission judgement unit 69, when the reference radio channel specifying information supplied from the reference radio channel specifying information extraction unit 67 does not indicate a radio channel of the own station, or a state in which it does not indicate a radio channel of the own station is consecutively encountered for a prescribed number of times, the transmission data contained in the current unit of selective combination are not transmitted through the wire transmission line 97 or 99.

[0072] Using this configuration in which the base station does not transmits the transmission data through the wire transmission line when the reference radio channel specifying information does not indicate a radio channel of the own station or a state in which it does not indicate a radio channel of the own station is consecutively encountered for a prescribed number of times, it becomes possible to reduce the wire transmission line traffic. In other words, it becomes possible to realize the same level of the wire transmission line traffic as in a case of not carrying out the maximum soft handover.

[0073] As described, according to the present invention, one radio channel is set as the reference radio channel among a plurality of radio channels, and the transmission power control is carried out so that the receiving quality of the reference radio channel becomes the prescribed reference quality, while this reference radio channel is not switched within the selective combination interval. Consequently, even in the selective combination interval in which a relationship between the receiving qualities of the base stations is reversed, it is possible for the reference radio channel to always satisfy the prescribed reference quality within the selective combination interval.

[0074] Note here that the present invention can be applied to the uplink radio channels alone, the downlink radio channels alone, or both of them simultaneously, by setting the reference radio channel among uplink radio channels alone or among downlink radio channels alone, or else by setting one reference radio channel among uplink radio channels while setting another reference radio channel among downlink radio channels separately.

[0075] Also, according to the present invention, the radio channel which has the best receiving quality immediately before each unit of selective combination among a plurality of radio channels is set as the reference radio channel, and the transmission power control is carried out so that the receiving quality of the reference radio channel becomes the prescribed reference quality. Consequently, it is possible for the reference radio channel to always satisfy the prescribed reference quality within the selective combination interval.

[0076] Also, according to the present invention, the mobile station during the soft handover sets the radio channel which is continually commanding the lowering of the transmission power for the longest period of time prior to the transmission power control information immediately before the current unit of selective combination as the reference radio channel for the current unit of selective combination, and this reference radio channel is not switched within the selective combination interval. Consequently, it is possible for the reference radio channel to always satisfy the prescribed reference quality within the selective combination interval.

[0077] Also, according to the present invention, the receiving quality is measured immediately before each unit of selective combination at the receiving side, and an information on the measured receiving quality, i.e., the measured receiving quality itself or an information indicative of the measured receiving quality, is transmitted to the transmitting side alongside the transmission power control information. Then, the transmitting side judges which radio channel is the best according to the information on the measured receiving quality, sets the radio channel that is judged the best as the reference radio channel, and this reference radio channel is not switched within the selective combination interval. Consequently, it is possible for the reference radio channel

to always satisfy the prescribed reference quality within the selective combination interval.

[0078] In addition, according to the present invention, an information for specifying which radio channel is the reference radio channel is included at each unit of selective combination in the uplink radio channel transmitted from the mobile station. Then, at each base station, when the received reference radio channel specifying information in the current unit of selective combination indicates a radio channel of the own station, the transmission data contained within the current unit of selective combination are transmitted to the combining station via the wire transmission line, whereas when the received reference radio channel specifying information does not indicate a radio channel of the own station or when a state in which it does not indicate a radio channel of the own station is consecutively encountered for a prescribed number of times, the transmission data contained within the current unit of selective combination are not transmitted to the combining station via the wire transmission line. Consequently, it becomes possible to reduce the wire transmission traffic to the same level as that in a case of not carrying out the maximum soft handover.

[0079] It is to be noted that, besides those already mentioned above, many modifications and variations of the above embodiments may be made without departing from the novel and advantageous features of the present invention.

Claims

1. A method for controlling transmission powers during a soft handover in a CDMA mobile communication system where a mobile station (MS) is simultaneously connected with a plurality of base stations (BS1, BS2) via a plurality of radio channels (91, 93, 95) while said plurality of base stations (BS1, BS2) is connected with a combining station (CS) via a plurality of wire transmission lines (97, 99) so that a plurality of transmission signals from said plurality of base stations (BS1, BS2) to the combining station (CS) is selectively combined at a prescribed selective combination interval (A; B; C) by the combining station (CS) and a plurality of transmission signals from said plurality of base stations (BS1, BS2) to the mobile station (MS) is selectively combined at the prescribed selective combination interval (A; B; C) by the mobile station (MS), the method comprising the steps of:

selecting one radio channel among said plurality of radio channels as a reference radio channel for a prescribed selective combination interval (A; B; C);

maintaining the selected one radio channel as

the reference radio channel, even if during the prescribed selective combination interval the receiving quality of another radio channel becomes better than the receiving quality of the radio channel selected as reference radio channel; and

carrying out a transmission power control for a prescribed transmission power control interval within the prescribed selective combination interval, so that a receiving quality of the reference radio channel satisfies a prescribed reference quality.

2. The method of claim 1, wherein the selecting step selects a radio channel (91; 93; 95) which has a best receiving quality immediately before each unit of selective combination (A; B; C) as the reference radio channel for said each unit of selective combination.
3. The method of claim 1, wherein the selecting step selects said one radio channel from a plurality of uplink radio channels (93, 95).
4. The method of claim 3, further comprising the steps of:

judging at each base station (BS1, BS2) whether a receiving quality of a received uplink radio channel satisfies the prescribed reference quality or not at the prescribed transmission power control interval; and transmitting from each base station through a downlink radio channel a transmission power control information at the prescribed transmission power control interval, wherein the transmission power control information commands a lowering of an upward transmission power when the receiving quality of the received uplink radio channel is judged as satisfying the prescribed reference quality or a raising of the upward transmission power when the receiving quality of the received uplink radio channel is judged as not satisfying the prescribed reference quality; and wherein at the selecting step, the mobile station (MS) receives a plurality of transmission power control informations from said plurality of base stations (BS1, BS2), and selects an uplink radio channel received by one base station that is transmitting the transmission power control information which is continually commanding a lowering of the upward transmission power for a longest period of time prior to the transmission power control information immediately before a current selective combination interval (A; B; C) as the reference radio channel for the current unit of selective combination (A; B; C); and

at the carrying out step, the mobile station (MS) carries out the transmission power control during the current unit of selective combination (A; B; C) by lowering or raising the upward transmission power at the prescribed transmission power control interval according to the transmission power control information transmitted from said one base station (BS1; BS2) that is receiving the reference radio channel for the current unit of selective combination.

5. The method of claim 3, further comprising the steps of:

measuring at each base station (BS1, BS2) a receiving quality of a received uplink radio channel immediately before each unit of selective combination; and transmitting from each base station (BS1, BS2) to the mobile station (MS) a transmission power control information and an information on a measured receiving quality; and wherein at the selecting step, the mobile station (MS) selects an uplink radio channel which has a best receiving quality according to said information on a measured receiving quality for a plurality of uplink radio channels as the reference radio channel for a current unit of selective combination; and at the carrying out step, the mobile station (MS) carries out the transmission power control during the current selective combination interval (A; B; C) by lowering or raising the upward transmission power at the prescribed transmission power control interval according to the transmission power control information transmitted from one base station (BS1; BS2) that is receiving the reference radio channel for the current unit of selective combination.

6. The method of claim 1, wherein the selecting step selects said one radio channel from a plurality of downlink radio channels (91).

7. The method of claim 6, further comprising the steps of:

judging at the mobile station (MS) whether a receiving quality of a received downlink radio channel satisfies the prescribed reference quality or not at the prescribed transmission power control interval; and transmitting from the mobile station (MS) through an uplink radio channel a transmission power control information at the prescribed transmission power control interval, wherein the transmission power control information commands a lowering of a downward transmis-

sion power when the receiving quality of the received downlink radio channel is judged as satisfying the prescribed reference quality or a raising of the downward transmission power when the receiving quality of the received downlink radio channel is judged as not satisfying the prescribed reference quality; and wherein at the selecting step, the mobile station (MS) receives a plurality of downlink radio channels from said plurality of base stations (BS1, BS2), and selects a downlink radio channel which has a best receiving quality immediately before a current selective combination interval (A; B; C) as the reference radio channel for the current unit of selective combination (A; B; C); and at the carrying out step, the mobile station (MS) transmits an identical transmission power control information to all of said plurality of base stations (BS1, BS2) at the prescribed transmission power control interval according to a receiving quality of the reference radio channel for the current unit of selective combination (A; B; C), and each base station (BS1, BS2) carries out the transmission power control during the current unit of selective combination by lowering or raising the downward transmission power at the prescribed transmission power control interval according to the identical transmission power control information transmitted from the mobile station (MS).

8. The method of claim 1, further comprising the steps of:

transmitting from the mobile station (MS) an uplink radio channel containing a reference radio channel specifying information for specifying the reference radio channel for each unit of selective combination (A; B; C); judging at each base station (BS1, BS2) whether the reference radio channel for a current unit of selective combination specified by the reference radio channel specifying information is a radio channel of said each base station (BS1, BS2) or not; and transmitting transmission data contained within the current selective combination interval (A; B; C) from said each base station (BS1, BS2) to the combining station via a wire transmission line when the reference radio channel for the current unit of selective combination is a radio channel of said each base station.

9. The method of claim 8, wherein said each base station (BS1, BS2) does not transmit the transmission data contained within the current unit of selective combination to the combining station via the wire

transmission line when the reference radio channel for the current unit of selective combination is not a radio channel of said each base station.

10. The method of claim 8, wherein said each base station (BS1, BS2) does not transmit the transmission data contained within the current selective combination interval (A; B; C) to the combining station via the wire transmission line when a state in which the reference radio channel for the current selective combination interval (A; B; C) is not a radio channel of said each base station (BS1, BS2) is consecutively encountered for a prescribed number of times.

11. A CDMA mobile communication system comprising a mobile station, a plurality of base stations, and a combining station, where the mobile station (MS) during a soft handover is simultaneously connected with a plurality of base stations via a plurality of radio channels while said plurality of base stations are connected with a combining station via a plurality of wire transmission lines so that a plurality of transmission signals from said plurality of base stations to the combining station are selectively combined at a prescribed selective combination interval (A; B; C) by the combining station and a plurality of transmission signals from said plurality of base stations to the mobile station (MS) are selectively combined at the prescribed selective combination interval (A; B; C) by the mobile station, wherein the mobile station (MS) includes:

a selection unit for selecting one radio channel among said plurality of radio channels as a reference radio channel for a prescribed selective combination interval (A; B; C) and maintaining the selected one radio channel as the reference radio channel, even if during the prescribed selective combination interval the receiving quality of another radio channel becomes better than the receiving quality of the radio channel selected as reference radio channel; and

a control unit for carrying out a transmission power control for a prescribed transmission power control interval within the prescribed selective combination interval so that a receiving quality of the reference radio channel satisfies a prescribed reference quality.

12. The system of claim 11, wherein the selection unit selects a radio channel which has a best receiving quality immediately before each unit of selective combination as the reference radio channel for said each unit of selective combination.

13. The system of claim 11, wherein the selection unit

selects said one radio channel from a plurality of uplink radio channels.

14. The system of claim 13, wherein each base station (BS1, BS2) includes:

a unit for judging whether a receiving quality of a received uplink radio channel satisfies the prescribed reference quality or not at the prescribed transmission power control interval; and a unit for transmitting through a downlink radio channel a transmission power control information at the prescribed transmission power control interval, wherein the transmission power control information commands a lowering of an upward transmission power when the receiving quality of the received uplink radio channel is judged as satisfying the prescribed reference quality or a raising of the upward transmission power when the receiving quality of the received uplink radio channel is judged as not satisfying the prescribed reference quality;

and wherein the selection unit of the mobile station (MS) receives a plurality of transmission power control informations from said plurality of base stations, and selects an uplink radio channel received by one base station that is transmitting the transmission power control information which is continually commanding a lowering of the upward transmission power for a longest period of time prior to the transmission power control information immediately before a current selective combination interval (A; B; C) as the reference radio channel for the current unit of selective combination; and the control unit of the mobile station (MS) carries out the transmission power control during the current selective combination interval (A; B; C) by lowering or raising the upward transmission power at the prescribed transmission power control interval according to the transmission power control information transmitted from said one base station that is receiving the reference radio channel for the current unit of selective combination.

15. The system of claim 13, wherein each base station includes:

a unit for measuring a receiving quality of a received uplink radio channel immediately before each unit of selective combination; and a unit for transmitting to the mobile station (MS) a transmission power control information and an information on a measured receiving quality; and wherein the selection unit of the mobile station (MS) selects an uplink radio channel which

has a best receiving quality according to said information on a measured receiving quality for a plurality of uplink radio channels as the reference radio channel for a current unit of selective combination; and

the control unit of the mobile station (MS) carries out the transmission power control during the current selective combination interval (A; B; C) by lowering or raising the upward transmission power at the prescribed transmission power control interval according to the transmission power control information transmitted from one base station that is receiving the reference radio channel for the current unit of selective combination.

16. The system of claim 11, wherein the selection unit selects said one radio channel from a plurality of downlink radio channels.

17. The system of claim 16, wherein the mobile station (MS) further includes:

a unit for judging whether a receiving quality of a received downlink radio channel satisfies the prescribed reference quality or not at the prescribed transmission power control interval; and

a unit for transmitting through an uplink radio channel a transmission power control information at the prescribed transmission power control interval, wherein the transmission power control information commands a lowering of a downward transmission power when the receiving quality of the received downlink radio channel is judge as satisfying the prescribed reference quality or a raising of the downward transmission power when the receiving quality of the received downlink radio channel is judged as not satisfying the prescribed reference quality;

and wherein the selection unit of the mobile station (MS) receives a plurality of downlink radio channels from said plurality of base stations, and selects a downlink radio channel which has a best receiving quality immediately before a current selective combination interval (A; B; C) as the reference radio channel for the current unit of selective combination; and

the control unit of the mobile station (MS) transmits an identical transmission power control information to all of said plurality of base stations at the prescribed transmission power control interval according to a receiving quality of the reference radio channel for the current unit of selective combination, so that each base station (BS1, BS2) actually carries out the transmission power control during the current selective

combination interval (A; B; C) by lowering or raising the downward transmission power at the prescribed transmission power control interval according to the identical transmission power control information transmitted from the mobile station.

18. The system of claim 11, wherein the mobile station (MS) further includes:

a unit for transmitting an uplink radio channel containing a reference radio channel specifying information for specifying the reference radio channel for each unit of selective combination; and wherein each base station (BS1, BS2) includes:

a unit for judging whether the reference radio channel for a current selective combination interval (A; B; C) specified by the reference radio channel specifying information is a radio channel of said each base station (BS1, BS2) or not; and

a unit for transmitting transmission data contained within the current selective combination interval (A; B; C) to the combining station via a wire transmission line when the reference radio channel for the current selective combination interval (A; B; C) is a radio channel of said each base station.

19. The system of claim 18, wherein said each base station (BS1, BS2) does not transmit the transmission data contained within the current selective combination interval (A; B; C) to the combining station via the wire transmission line when the reference radio channel for the current unit of selective combination is not a radio channel of said each base station.

20. The system of claim 18, wherein said each base station (BS1, BS2) does not transmit the transmission data contained within the current selective combination interval (A; B; C) to the combining station via the wire transmission line when a state in which the reference radio channel for the current selective combination interval (A; B; C) is not a radio channel of said each base station (BS1, BS2) is consecutively encountered for a prescribed number of times.

Patentansprüche

1. Verfahren zum Steuern von Sendeleistungen während eines Soft-Handovers (einer weichen Übergabe) in einem CDMA Mobilkommunikationssystem, bei dem eine Mobilstation (MS) gleichzeitig von einer Vielzahl von Basisstationen (BS1, BS2) über ei-

ne Vielzahl von Funkkanälen (91, 93, 95) verbunden ist, während die Vielzahl von Basisstationen (BS1, BS2) über eine Vielzahl von Drahtübertragungsleitungen (97, 99) mit einer Kombinierstation verbunden ist, so daß eine Vielzahl von Übertragungssignalen von der Vielzahl von Basisstationen (BS1, BS2) an die Kombinierstation (CS) selektiv bei einem vorgegebenen selektiven Kombinationsintervall (A; B; C) durch die Kombinierstation (CS) kombiniert wird und eine Vielzahl von Übertragungssignalen von der Vielzahl von Basisstationen (BS1, BS2) an die Mobilstation (MS) selektiv bei dem vorgeschriebenen selektiven Kombinationsintervall (A; B; C) durch die Mobilstation (MS) kombiniert wird, wobei das Verfahren die folgenden Schritte umfaßt:

Wählen eines Funkkanals aus der Vielzahl von Funkkanälen als einen Referenzfunkkanal für ein vorgeschriebenes selektives Kombinationsintervall (A; B; C);

Aufrechterhalten des gewählten einen Funkkanals als den Referenzfunkkanal, selbst wenn während des vorgeschriebenen selektiven Kombinationsintervalls die Empfangsqualität des anderen Funkkanals besser wird als die Empfangsqualität des Funkkanals, der als Referenzfunkkanal gewählt ist;

Ausführen einer Sendeleistungssteuerung für ein vorgeschriebenes Sendeleistungs-Steuerintervall innerhalb des vorgeschriebenen selektiven Kombinationsintervalls, so daß eine Empfangsqualität des Referenzfunkkanals eine vorgeschriebene Referenzqualität erfüllt.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Wählschritt einen Funkkanal (91; 93; 95), der eine beste Empfangsqualität unmittelbar vor jeder Einheit für eine selektive Kombination (A; B; C) als den Referenzfunkkanal für die jede Einheit für eine selektive Kombination wählt.

3. Verfahren nach Anspruch 1, dadurch gekennzeichnet daß der Wählschritt einen Funkkanal aus einer Vielzahl von aufwärts gerichteten (uplink) Funkkanälen (93, 95) wählt.

4. Verfahren nach Anspruch 3, ferner umfassend die folgenden Schritte: Beurteilen an jeder Basisstation (BS1, BS2), ob eine Empfangsqualität eines empfangenen Uplink-Funkkanals die vorgeschriebene Referenzqualität bei dem vorgeschriebenen Sendeleistungs-Steuerintervall erfüllt oder nicht; und Senden von jeder Basisstation über einen abwärts gerichteten (downlink) Funkkanal einer Sendeleistungs-Steuerinformation bei dem vorgeschriebe-

nen Sendeleistungs-Steuerintervall, wobei die Sendeleistungs-Steuerinformation ein Absenken einer aufwärts gerichteten Sendeleistung, wenn die Empfangsqualität des empfangenen Uplink-Funkkanals als die vorgeschriebene Referenzqualität erfüllend beurteilt wird, oder ein Anheben der aufwärts gerichteten Sendeleistung, wenn die Empfangsqualität des empfangenen Uplink-Funkkanals als die vorgeschriebene Referenzqualität nicht erfüllend beurteilt wird, befiehlt; und wobei bei dem Wählschritt die Mobilstation (MS) eine Vielzahl von Sendeleistungs-Steuerinformationen von der Vielzahl von Basisstationen (BS1, BS2) empfängt, und einen Uplink-Funkkanal wählt, der von einer Basisstation empfangen wird, die die Sendeleistungs-Steuerinformation überträgt, die kontinuierlich eine Absenkung der aufwärts gerichteten Sendeleistung für eine längste Zeitperiode vor der Sendeleistungs-Steuerinformation unmittelbar vor einem gegenwärtigen selektiven Kombinerintervall (A; B; C) befiehlt, als den Referenzfunkkanal für die gegenwärtige Einheit für eine selektive Kombination (A; B; C) wählt; und in dem Ausführungsschritt die Mobilstation (MS) die Sendeleistungssteuerung während der gegenwärtigen Einheit für eine selektive Kombination (A; B; C) durch Absenken oder Anheben der aufwärts gerichteten Sendeleistung bei dem vorgeschriebenen Sendeleistungs-Steuerintervall gemäß der Sendeleistungs-Steuerinformation, die von der einen Basisstation (BS1; BS2), die den Referenzfunkkanal für die gegenwärtige Einheit für eine selektive Kombination empfängt, ausführt.

5. Verfahren nach Anspruch 3, ferner umfassend die folgenden Schritte: Messen einer Empfangsqualität eines empfangenen Uplink-Funkkanals unmittelbar vor jeder Einheit für eine selektive Kombination an jeder Basisstation (BS1, BS2); und Senden von jeder Basisstation (BS1, BS2) an die Mobilstation (MS) einer Sendeleistungs-Steuerinformation und einer Information über eine gemessene Empfangsqualität; und wobei in dem Wählschritt die Mobilstation (MS) einen Uplink-Funkkanal, der eine beste Empfangsqualität aufweist, gemäß der Information über eine gemessene Empfangsqualität für eine Vielzahl von Uplink-Funkkanälen als den Referenzfunkkanal für eine gegenwärtige Einheit für eine selektive Kombination wählt; und in dem Ausführungsschritt die Mobilstation (MS) die Sendeleistungssteuerung während des gegenwärtigen selektiven Kombinationsintervalls (A; B; C) durch Absenken oder Anheben der aufwärts gerichteten Sendeleistung in dem vorgeschriebenen Sendeleistungs-Steuerintervall gemäß der Sendeleistungs-Steuerinformation, die von einer Basisstation (BS1; BS2) übertragen wird, die den Referenzfunkkanal für die gegenwärtige Einheit für eine selektive Kom-

bination empfängt, ausführt.

6. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Wählschritt den einen Funkkanal aus einer Vielzahl von Downlink-Funkkanälen (91) wählt.
7. Verfahren nach Anspruch 6, ferner umfassend die folgenden Schritte: Beurteilen an der Mobilstation (MS), ob eine Empfangsqualität eines empfangenen Downlink-Funkkanals die vorgeschriebene Referenzqualität in dem vorgeschriebenen Sendeleistungs-Steuerintervall erfüllt oder nicht; und Senden von der Mobilstation (MS) über einen Uplink-Funkkanal einer Sendeleistungs-Steuerinformation bei dem vorgegebenen Sendeleistungs-Steuerintervall, wobei die Sendeleistungs-Steuerinformation ein Absenken einer abwärts gerichteten Sendeleistung, wenn die Empfangsqualität des empfangenen Downlink-Funkkanals als die vorgeschriebene Referenzqualität erfüllend beurteilt wird, oder ein Anheben der abwärts gerichteten Sendeleistung, wenn die Empfangsqualität des empfangenen Downlink-Funkkanals als die vorgeschriebene Referenzqualität nicht erfüllend beurteilt wird, befiehlt; und wobei bei dem Wählschritt die Mobilstation (MS) eine Vielzahl von Downlink-Funkkanälen von der Vielzahl von Basisstationen (BS1, BS2) empfängt, und einen Downlink-Funkkanal, der eine beste Empfangsqualität unmittelbar vor einem gegenwärtigen selektiven Kombinationsintervall (A; B; C) aufweist, als den Referenzfunkkanal für die gegenwärtige Einheit für eine selektive Kombination (A; B; C) wählt; und in dem Ausführungsschritt die Mobilstation (MS) eine identische Sendeleistungs-Steuerinformation an sämtliche der Vielzahl von Basisstationen (BS1, BS2) bei dem vorgeschriebenen Sendeleistungs-Steuerintervall gemäß einer Empfangsqualität des Referenzfunkkanals für die gegenwärtige Einheit für eine selektive Kombination (A; B; C) überträgt, und jede Basisstation (BS1, BS2) die Sendeleistungssteuerung während der gegenwärtigen Einheit für eine selektive Kombination durch Absenken oder Anheben der abwärts gerichteten Sendeleistung bei dem vorgeschriebenen Sendeleistungs-Steuerintervall gemäß der identischen Sendeleistungs-Steuerinformation, die von der Mobilstation (MS) übertragen wird, ausführt.
8. Verfahren nach Anspruch 1, ferner umfassend die folgenden Schritte: Senden von der Mobilstation (MS) eines Uplink-Funkkanals, der eine Referenzfunkkanal-Spezifikationsinformation zum Spezifizieren des Referenzfunkkanals für jede Einheit für eine selektive Kombination (A; B; C) enthält;

Beurteilen an jeder Basisstation (BS1, BS2), ob der Referenzfunkkanal für die gegenwärtige

- Einheit für eine selektive Kombination, der durch die Referenzfunkkanal-Spezifikationsinformation spezifiziert wird, ein Funkkanal der jeden Basisstation (BS1, BS2) ist oder nicht; und
- Übertragen von Sendedaten, die in dem gegenwärtigen selektiven Kombinationsintervall (A; B; C) enthalten sind, von der jeden Basisstation (BS1, BS2) an die Kombinerstation über eine Drahtübertragungsleitung, wenn der Referenzfunkkanal für die gegenwärtige Einheit für eine selektive Kombination ein Funkkanal der jeden Basisstation ist.
9. Verfahren nach Anspruch 8, dadurch gekennzeichnet, daß jede Basisstation (BS1, BS2) die Sendedaten, die innerhalb der gegenwärtigen Einheit für eine selektive Kombination enthalten sind, an die Kombinerstation über die Drahtübertragungsleitung nicht sendet, wenn der Referenzfunkkanal für die gegenwärtige Einheit für eine selektive Kombination nicht ein Funkkanal der jeden Basisstation ist.
10. Verfahren nach Anspruch 8, dadurch gekennzeichnet, daß jede Basisstation (BS1, BS2) die Sendedaten, die in dem gegenwärtigen selektiven Kombinationsintervall (A; B; C) enthalten sind, nicht an die Kombinerstation über die Drahtübertragungsleitung sendet, wenn ein Zustand, in dem der Referenzfunkkanal für das gegenwärtige selektive Kombinationsintervall (A; B; C) nicht ein Funkkanal der jeden Basisstation (BS1, BS2) ist, aufeinanderfolgend für eine vorgegebene Anzahl von Malen angetroffen wird.
11. CDMA Mobilkommunikationssystem, umfassend eine Mobilstation, eine Vielzahl von Basisstationen, und eine Kombinerstation, wobei die Mobilstation (MS) während eines Soft-Handovers (einer weichen Übergabe) gleichzeitig mit einer Vielzahl von Basisstationen über eine Vielzahl von Funkkanälen verbunden ist, während die Vielzahl von Basisstationen mit einer Kombinerstation über eine Vielzahl von Drahtübertragungsleitungen verbunden sind, so daß eine Vielzahl von Sendesignalen von der Vielzahl von Basisstationen an die Kombinerstation selektiv bei einem vorgeschriebenen selektiven Kombinationsintervall (A; B; C) durch die Kombinerstation kombiniert werden und eine Vielzahl von Sendesignalen von der Vielzahl von Basisstationen an die Mobilstation (MS) selektiv bei dem vorgeschriebenen selektiven Kombinationsintervall (A; B; C) durch die Mobilstation kombiniert werden, wobei die Mobilstation (MS) umfaßt:
- eine Wähleinheit zum Wählen eines Funkkanals von der Vielzahl von Funkkanälen als einen Referenzfunkkanal für ein vorgeschriebenes selektives Kombinationsintervall (A; B; C) und zum Aufrechterhalten des gewählten einen Funkkanals als den Referenzfunkkanal, selbst wenn während des vorgeschriebenen selektiven Kombinationsintervalls die Empfangsqualität eines anderen Funkkanals besser wird als die Empfangsqualität des Funkkanals, der als Referenzfunkkanal gewählt wird; und
- eine Steuereinheit zum Ausführen einer Sendeleistungssteuerung für ein vorgeschriebenes Sendeleistungs-Steuerintervall innerhalb des vorgeschriebenen selektiven Kombinationsintervalls, so daß eine Empfangsqualität des Referenzfunkkanals eine vorgeschriebene Referenzqualität erfüllt.
12. System nach Anspruch 11, dadurch gekennzeichnet, daß die Wähleinheit einen Funkkanal, der eine beste Empfangsqualität unmittelbar vor jeder Einheit für eine selektive Kombination aufweist, als den Referenzfunkkanal für die jede Einheit für eine selektive Kombination wählt.
13. System nach Anspruch 11, dadurch gekennzeichnet, daß die Wähleinheit den einen Funkkanal aus einer Vielzahl von Uplink-Funkkanälen wählt.
14. System nach Anspruch 13, dadurch gekennzeichnet, daß jede Basisstation (BS1, BS2) umfaßt:
- eine Einheit zum Beurteilen, ob eine Empfangsqualität eines empfangenen Uplink-Funkkanals die vorgeschriebene Referenzqualität bei dem vorgeschriebenen Sendeleistungs-Steuerkanal erfüllt oder nicht; und eine Einheit zum Senden durch einen Downlink-Funkkanal einer Sendeleistungs-Steuerinformation bei dem vorgeschriebenen Sendeleistungs-Steuerintervall, wobei die Sendeleistungs-Steuerinformation eine Absenkung einer aufwärts gerichteten Sendeleistung, wenn die Empfangsqualität des empfangenen Uplink-Funkkanals als die vorgeschriebene Referenzqualität erfüllend beurteilt wird, oder eine Anhebung der aufwärts gerichteten Sendeleistung, wenn die Empfangsqualität des empfangenen Uplink-Funkkanals als die vorgeschriebene Referenzqualität nicht erfüllend beurteilt wird, befiehlt; und
- wobei die Wähleinheit der Mobilstation (MS) eine Vielzahl von Sendeleistungs-Steuerinformationen von der Vielzahl von Basisstationen empfängt, und einen Uplink-Funkkanal, der von einer Basisstation empfangen wird, die die

Sendeleistungs-Steuerinformation sendet, die kontinuierlich ein Absenken der aufwärts gerichteten Sendeleistung für eine längste Zeitperiode vor der Sendeleistungs-Steuerinformation unmittelbar vor einem gegenwärtigen selektiven Kombinationsintervall (A; B; C) befiehlt, als den Referenzfunkkanal für die gegenwärtige Einheit für eine selektive Kombination wählt; und

die Steuereinheit der Mobilstation (MS) die Sendeleistungssteuerung während des gegenwärtigen selektiven Kombinationsintervalls (A; B; C) durch Absenken oder Anheben der aufwärts gerichteten Sendeleistung bei dem vorgeschriebenen Sendeleistungs-Steuerintervall gemäß der Sendeleistungs-Steuerinformation, die von der einen Basisstation gesendet wird, die den Referenzfunkkanal für die gegenwärtige Einheit für eine selektive Kombination empfängt, ausführt.

15. System nach Anspruch 13, dadurch gekennzeichnet, daß jede Basisstation umfaßt:

eine Einheit zum Messen einer Empfangsqualität eines empfangenen Uplink-Funkkanals unmittelbar vor jeder Einheit für eine selektive Kombination; und

eine Einheit zum Senden an die Mobilstation (MS) einer Sendeleistungs-Steuerinformation und einer Information über eine gemessene Empfangsqualität; und

wobei die Wähleinheit der Mobilstation (MS) einen Uplink-Funkkanal, der gemäß der Information über eine gemessene Empfangsqualität für eine Vielzahl von Uplink-Funkkanälen eine beste Empfangsqualität aufweist, als den Referenzfunkkanal für eine gegenwärtige Einheit für eine selektive Kombination wählt; und

die Steuereinheit der Mobilstation (MS) die Sendeleistungssteuerung während des gegenwärtigen selektiven Kombinationsintervalls (A; B; C) durch Absenken oder Anheben der aufwärts gerichteten Sendeleistung bei dem vorgeschriebenen Sendeleistungs-Steuerintervall gemäß der Sendeleistungs-Steuerinformation, die von einer Basisstation gesendet wird, die den Referenzkanal für die gegenwärtige Einheit für eine selektive Kombination empfängt, ausführt.

16. System nach Anspruch 11, dadurch gekennzeichnet, daß die Wähleinheit den einen Funkkanal aus einer Vielzahl von Downlink-Funkkanälen wählt.

17. System nach Anspruch 16, dadurch gekennzeichnet, daß die Mobilstation (MS) ferner umfaßt:

eine Einheit zum Beurteilen, ob eine Empfangsqualität eines empfangenen Downlink-Funkkanals die vorgeschriebene Referenzqualität bei dem vorgeschriebenen Sendeleistungs-Steuerintervall erfüllt oder nicht; und

eine Einheit zum Senden durch einen Uplink-Funkkanal einer Sendeleistungs-Steuerinformation bei dem vorgeschriebenen Sendeleistungs-Steuerintervall, wobei

die Sendeleistungs-Steuerinformation ein Absenken einer abwärts gerichteten Sendeleistung, wenn die Empfangsqualität des empfangenen Downlink-Funkkanals als die vorgeschriebene Referenzqualität erfüllend beurteilt, oder ein Anheben der abwärts gerichteten Sendeleistung, wenn die Empfangsqualität des empfangenen Downlink-Funkkanals als die vorgeschriebene Referenzqualität nicht erfüllend beurteilt, befiehlt, und wobei die Wähleinheit der Mobilstation (MS) eine Vielzahl von Downlink-Funkkanälen von der Vielzahl von Basisstationen empfängt, und einen Downlink-Funkkanal wählt, der eine beste Empfangsqualität unmittelbar vor einem gegenwärtigen selektiven Kombinationsintervall (A; B; C) aufweist, als den Referenzfunkkanal für die gegenwärtige Einheit für eine selektive Kombination wählt; und

die Steuereinheit der Mobilstation (MS) eine identische Sendeleistungs-Steuerinformation an sämtliche der Vielzahl von Basisstationen bei dem vorgeschriebenen Sendeleistungs-Steuerintervall gemäß einer Empfangsqualität des Referenzfunkkanals für die gegenwärtige Einheit für eine selektive Kombination überträgt, so daß jede Basisstation (BS1, BS2) tatsächlich die Sendeleistungssteuerung während des gegenwärtigen selektiven Kombinationsintervalls (A; B; C) durch Absenken oder Anheben der abwärts gerichteten Sendeleistung bei dem vorgeschriebenen Sendeleistungs-Steuerintervall gemäß der identischen Sendeleistungs-Steuerinformation, die von der Mobilstation übertragen wird, ausführt.

18. System nach Anspruch 11, dadurch gekennzeichnet, daß die Mobilstation (MS) ferner umfaßt:

eine Einheit zum Senden eines Uplink-Funkkanals, der eine Referenzfunkkanal-Spezifikationsinformation zum Spezifizieren des Referenzfunkkanals für jede Einheit für eine selek-

tive Kombination enthält;

und wobei jede Basisstation (BS1, BS2) umfaßt: eine Einheit zum Beurteilen, ob der Referenzfunkkanal für ein gegenwärtiges selektives Kombinationsintervall (A; B; C), der von der Referenzfunkkanal-Spezifikationsinformation spezifiziert wird, ein Funkkanal der jeden Basisstation (BS1, BS2) ist oder nicht; und

eine Einheit zum Übertragen von Sendedaten, die in dem gegenwärtigen selektiven Kombinationsintervall (A; B; C) enthalten sind, an die Kombinierstation über eine Drahtübertragungsleitung, wenn der Referenzfunkkanal für das gegenwärtige selektive Kombinationsintervall (A; B; C) ein Funkkanal der jeden Basisstation ist.

19. System nach Anspruch 18, dadurch gekennzeichnet, daß jede Basisstation (BS1, BS2) die Sendedaten, die in dem gegenwärtigen selektiven Kombinationsintervall (A; B; C) enthalten sind, nicht an die Kombinierstation über die Drahtübertragungsleitung sendet, wenn der Referenzfunkkanal für die gegenwärtige Einheit für eine selektive Kombination nicht ein Funkkanal der jeden Basisstation ist.

20. System nach Anspruch 18, dadurch gekennzeichnet, daß jede Basisstation (BS1, BS2) die Sendedaten, die in dem gegenwärtigen selektiven Kombinationsintervall (A; B; C) enthalten sind, an die Kombinierstation über die Drahtübertragungsleitung nicht überträgt, wenn ein Zustand, in dem der Referenzkanal für das gegenwärtige selektive Kombinationsintervall (A; B; C) nicht ein Funkkanal der jeden Basisstation (BS1, BS2) ist, aufeinanderfolgend für eine vorgegebene Anzahl von Malen angetroffen wird.

Revendications

1. Procédé pour commander des puissances d'émission pendant une commutation programmée dans un système de communication mobile CDMA où une station mobile (MS) est simultanément reliée à une pluralité de stations de base (BS1, BS2) via une pluralité de canaux radio (91, 93, 95) tandis que ladite pluralité des stations de base (BS1, BS2) est reliée à une station de combinaison (CS) via une pluralité de lignes de transmission câblées (97, 99) de sorte qu'une pluralité de signaux d'émission provenant de ladite pluralité de stations de base (BS1, BS2) envoyée à la station de combinaison (CS) est sélectivement combinée à un intervalle de combinaison sélective prescrit (A; B; C) par la station de combinaison (CS) et une pluralité de signaux

d'émission provenant de ladite pluralité de stations de base (BS1, BS2) envoyée à la station mobile (MS) est sélectivement combinée à l'intervalle de combinaison sélectif prescrit (A; B; C) par la station mobile (MS), le procédé comprenant les étapes consistant à :

sélectionner un canal radio parmi ladite pluralité de canaux radio comme canal radio de référence pendant un intervalle de combinaison prescrit (A; B; C);

maintenir le canal radio sélectionné comme le canal radio de référence même si pendant l'intervalle de combinaison sélectif prescrit la qualité de réception d'un autre canal radio devient meilleure que la qualité du canal radio sélectionné comme canal radio de référence; et effectuer une commande de puissance d'émission pendant un intervalle de commande de puissance d'émission prescrit à l'intérieur de l'intervalle de combinaison sélectif prescrit, de sorte qu'une qualité de réception du canal radio de référence satisfait une qualité de référence prescrite.

2. Procédé selon la revendication 1, dans lequel l'étape de sélection sélectionne un canal radio (91; 93; 95) qui présente une qualité de réception la meilleure immédiatement avant chaque unité de combinaison sélective (A; B; C) comme le canal radio de référence pour ladite chaque unité de combinaison sélective.

3. Procédé selon la revendication 1, dans lequel l'étape de sélection sélectionne ledit canal radio parmi une pluralité de canaux radio à liaison montante (93, 95).

4. Procédé selon la revendication 3, comprenant en outre les étapes consistant à :

juger au niveau de chaque station de base (BS1, BS2) si une qualité de réception d'un canal radio à liaison montante reçu satisfait ou non la qualité de référence prescrite pendant l'intervalle de commande de puissance d'émission prescrit; et

transmettre à partir de chaque station de base par l'intermédiaire d'un canal radio à liaison descendante des informations de commande de puissance d'émission pendant l'intervalle de commande de puissance d'émission prescrit, dans lequel les informations de commande de puissance d'émission ordonnent un abaissement de la puissance d'émission montante lorsque la qualité de réception du canal radio à liaison montante reçu est jugée comme satisfaisant la qualité de référence prescrite ou une

élévation de la puissance d'émission montante lorsque la qualité de réception du canal radio à liaison montante reçu est jugée comme ne satisfaisant pas la qualité de référence prescrite ; et dans lequel à l'étape de sélection, la station mobile (MS) reçoit une pluralité d'informations de commande de puissance d'émission à partir de ladite pluralité des stations de base (BS1, BS2) et sélectionne un canal radio à liaison montante reçu par une station de base qui transmet les informations de commande de puissance d'émission qui ordonnent continuellement un abaissement de la puissance d'émission montante pendant une durée plus longue avant la transmission des informations de commande de puissance immédiatement avant un intervalle de combinaison sélective courant (A ; B ; C) comme le canal radio de référence pour l'unité courante de combinaison sélective (A ; B ; C) ; et à l'étape de mise en oeuvre, la station mobile (MS) effectue la commande de puissance d'émission pendant l'unité courante de combinaison sélective (A ; B ; C) en abaissant ou en élevant la puissance d'émission montante pendant l'intervalle de commande de puissance d'émission prescrit en conformité avec les informations de commande de puissance d'émission transmises à partir de ladite station de base (BS1 ; BS2) qui reçoit le canal radio de référence pendant l'unité courante de combinaison sélective.

5. Procédé selon la revendication 3, comprenant en outre les étapes consistant à :

mesurer à chaque station de base (BS1, BS2) une qualité de réception d'un canal radio à liaison montante reçu immédiatement avant chaque unité de combinaison sélective ; et transmettre de chaque station de base (BS1, BS2) à la station mobile (MS) des informations de commande de puissance d'émission et des informations concernant une qualité de réception mesurée ; et dans lequel à l'étape de sélection, la station mobile (MS) sélectionne un canal radio à liaison montante qui présente une qualité de réception la meilleure en conformité avec lesdites informations concernant une qualité de réception mesurée pour une pluralité de canaux radio à liaison montante comme le canal radio de référence pour l'unité courante de combinaison sélective ; et au moment de l'étape de mise en oeuvre, la station mobile (MS) effectue la commande de puissance d'émission pendant l'intervalle de combinaison sélective courant (A ; B ; C) en

abaissant ou en élevant la puissance d'émission montante à l'intervalle de commande de puissance d'émission prescrit en conformité avec les informations de commande de puissance d'émission transmises à partir d'une station de base (BS1 ; BS2) qui reçoit le canal radio de référence pour l'unité courante de combinaison sélective.

6. Procédé selon la revendication 1, dans lequel l'étape de sélection sélectionne ledit canal radio parmi une pluralité de canaux radio à liaison descendante (91).

7. Procédé selon la revendication 6, comprenant en outre les étapes consistant à :

juger au niveau de la station mobile (MS) si une qualité de réception d'un canal radio à liaison descendante reçu satisfait ou non la qualité de référence prescrite à l'intervalle de commande de puissance d'émission prescrit ; et transmettre à partir de la station mobile (MS) par l'intermédiaire d'un canal radio à liaison montante des informations de commande de puissance d'émission pendant l'intervalle de commande de puissance d'émission prescrit, dans lequel les informations de commande de puissance d'émission ordonnent un abaissement d'une puissance d'émission à liaison descendante lorsque la qualité de réception du canal radio à liaison descendante reçu est jugée comme satisfaisant la qualité de référence prescrite ou une augmentation de la puissance d'émission à liaison descendante lorsque la qualité de réception du canal radio à liaison descendante reçu est jugée comme ne satisfaisant pas la qualité de référence prescrite ; et dans lequel, à l'étape de sélection, la station mobile (MS) reçoit une pluralité de canaux radio à liaison descendante à partir de ladite pluralité de stations de base (BS1, BS2) et sélectionne un canal radio à liaison descendante qui présente une qualité de réception la meilleure immédiatement avant un intervalle de combinaison sélective courant (A ; B ; C) comme le canal radio de référence pour l'unité courante de combinaison sélective (A ; B ; C) ; et au moment de l'étape de mise en oeuvre, la station mobile (MS) transmet des informations de commande de puissance d'émission identiques, à la totalité de ladite pluralité des stations de base (BS1, BS2) pendant l'intervalle de commande de puissance d'émission prescrit en conformité avec une qualité de réception du canal radio de référence pour l'unité courante de combinaison sélective (A ; B ; C), et chaque station de base (BS1, BS2) effectue la com-

mande de puissance d'émission pendant l'unité courante de combinaison sélective en abaissant ou en élevant la puissance d'émission à liaison descendante pendant l'intervalle de commande de puissance d'émission prescrit en conformité avec les informations de commande de puissance d'émission identiques transmises à partir de la station mobile (MS).

8. Procédé selon la revendication 1, comprenant en outre les étapes consistant à :

transmettre à partir de la station mobile (MS) un canal radio à liaison montante contenant des informations spécifiant le canal radio de référence pour spécifier le canal radio de référence pour chaque unité de combinaison sélective (A ; B ; C) ;

juger à chaque station de base (BS1, BS2) si le canal radio de référence pour une unité courante de combinaison sélective spécifiée par les informations spécifiant le canal radio de référence est un canal radio de chaque dite station de base (BS1, BS2) ou non ; et

transmettre les données d'émission contenues à l'intérieur de l'intervalle de combinaison sélective courant (A ; B ; C) à partir de chaque dite station de base (BS1, BS2) à la station de combinaison via une ligne de transmission câblée lorsque le canal radio de référence pour l'unité courante de combinaison sélective est un canal radio de chaque dite station de base.

9. Procédé selon la revendication 8, dans lequel chaque dite station de base (BS1, BS2) ne transmet pas les données d'émission contenues à l'intérieur de l'unité courante de combinaison sélective à la station de combinaison via la ligne de transmission câblée lorsque le canal radio de référence pour l'unité courante de combinaison sélective n'est pas un canal radio de chaque dite station de base.

10. Procédé selon la revendication 8, dans lequel chaque dite station de base (BS1, BS2) ne transmet pas les données d'émission contenues à l'intérieur de l'intervalle de combinaison sélectif courant (A ; B ; C) à la station de combinaison via la ligne de transmission câblée lorsqu'un état dans lequel le canal radio de référence pour l'intervalle de combinaison sélectif courant (A ; B ; C) n'est pas un canal radio de chaque dite station de base (BS1, BS2), est consécutivement rencontré pendant un nombre prescrit de fois.

11. Système de communication mobile CDMA qui comprend une station mobile, une pluralité de stations de base et une station de combinaison, où la station mobile (MS) pendant une commutation program-

mée est simultanément reliée à une pluralité de stations de base via une pluralité de canaux radio tandis que ladite pluralité de stations de base est reliée à une station de combinaison via une pluralité de lignes de transmission câblées de sorte qu'une pluralité de signaux d'émission provenant de ladite pluralité de stations de base envoyée à la station de combinaison sont sélectivement combinés pendant un intervalle de combinaison sélective prescrit (A ; B ; C) par la station de combinaison et une pluralité de signaux d'émission provenant de ladite pluralité de stations de base envoyés à la station mobile (MS) sont sélectivement combinés à l'intervalle de combinaison sélective prescrit (A ; B ; C) par la station mobile, dans lequel la station mobile (MS) inclut :

une unité de sélection pour sélectionner un canal radio parmi ladite pluralité des canaux radio comme canal radio de référence pendant un intervalle de combinaison sélective prescrit (A ; B ; C) et pour maintenir le canal radio sélectionné comme le canal radio de référence même si pendant l'intervalle de combinaison sélective prescrit la qualité de réception d'un autre canal radio devient meilleure que la qualité de réception du canal radio sélectionné comme canal radio de référence ; et

une unité de commande pour effectuer une commande de la puissance d'émission pendant un intervalle de commande de puissance d'émission prescrit à l'intérieur de l'intervalle de combinaison sélective prescrit de sorte qu'une qualité de réception du canal radio de référence satisfait une qualité de référence prescrite.

12. Système selon la revendication 11, dans lequel l'unité de sélection sélectionne un canal radio qui présente une qualité de réception la meilleure immédiatement avant chaque unité de combinaison sélective comme le canal radio de référence pour chaque dite unité de combinaison sélective.

13. Système selon la revendication 11, dans lequel l'unité de sélection sélectionne ledit canal radio à partir d'une pluralité de canaux radio à liaison montante.

14. Système selon la revendication 13, dans lequel chaque station de base (BS1, BS2) inclut :

une unité pour juger si oui ou non une qualité de réception d'un canal radio à liaison montante reçu satisfait la qualité de référence prescrite pendant l'intervalle de commande de puissance d'émission prescrit ; et

une unité pour transmettre par l'intermédiaire d'un canal radio à liaison descendante des in-

formations de commande de puissance d'émission pendant l'intervalle de commande de puissance d'émission prescrit, dans lequel les informations de commande de puissance d'émission ordonnent un abaissement d'une puissance d'émission à liaison montante lorsque la qualité de réception du canal radio à liaison montante reçu est jugée comme satisfaisant la qualité de référence prescrite ou un abaissement de la puissance d'émission à liaison montante lorsque la qualité de réception du canal radio à liaison montante reçu est jugée comme ne satisfaisant pas la qualité de référence prescrite ;
 et dans lequel l'unité de sélection de la station mobile (MS) reçoit une pluralité d'informations de commande de puissance d'émission à partir de ladite pluralité de stations de base et sélectionne un canal radio à liaison montante reçu par une station de base qui transmet les informations de commande de puissance d'émission qui ordonnent continuellement un abaissement de la puissance d'émission à liaison montante pendant une durée plus longue avant les informations de commande de puissance d'émission immédiatement avant un intervalle de combinaison sélective courant (A ; B ; C) comme le canal radio de référence pour l'unité courante de combinaison sélective ; et l'unité de commande de la station mobile (MS) effectue la commande de puissance d'émission pendant l'intervalle de combinaison sélective courant (A ; B ; C) en abaissant ou en élevant la puissance d'émission de liaison montante pendant l'intervalle de commande de puissance d'émission prescrit en conformité avec les informations de commande de puissance d'émission transmises à partir de ladite station de base qui reçoit le canal radio de référence pendant l'unité courante de combinaison sélective.

15. Système selon la revendication 13, dans lequel chaque station de base inclut :

une unité pour mesurer une qualité de réception d'un canal radio à liaison montante reçu immédiatement avant chaque unité de combinaison sélective ; et

une unité pour transmettre à la station mobile (MS) des informations de commande de puissance d'émission et des informations concernant une qualité de réception mesurée ;

et dans lequel l'unité de sélection de la station mobile (MS) sélectionne un canal radio à liaison montante qui présente une qualité de réception la meilleure en conformité avec lesdites informations concernant une qualité de réception

mesurée pour une pluralité de canaux radio à liaison montante comme le canal radio de référence pour l'unité courante de combinaison sélective ; et

l'unité de commande de la station mobile (MS) effectue la commande de puissance d'émission pendant l'intervalle de combinaison sélective courant (A ; B ; C) en abaissant ou en élevant la puissance d'émission à liaison montante pendant l'intervalle de commande de puissance d'émission prescrit en conformité avec les informations de commande de puissance d'émission transmises à partir de la station de base qui reçoit le canal radio de référence pour l'unité courante de combinaison sélective.

16. Système selon la revendication 11, dans lequel l'unité de sélection sélectionne ledit canal radio à partir d'une pluralité de canaux radio à liaison descendante.

17. Système selon la revendication 16, dans lequel la station mobile (MS) inclut en outre :

une unité pour juger si oui ou non une qualité de réception d'un canal radio à liaison descendante reçu satisfait la qualité de référence prescrite pendant l'intervalle de commande de puissance d'émission prescrit ; et

une unité pour transmettre par l'intermédiaire d'un canal radio à liaison montante des informations de commande de puissance d'émission pendant l'intervalle de commande de puissance d'émission prescrit, dans lequel les informations de commande de puissance d'émission ordonnent un abaissement de la puissance d'émission à liaison descendante lorsque la qualité de réception du canal radio à liaison descendante reçu est jugée comme satisfaisant la qualité de référence prescrite ou une élévation de la puissance d'émission à liaison descendante lorsque la qualité de réception du canal radio à liaison descendante reçu est jugée comme ne satisfaisant pas la qualité de référence prescrite ;

et dans lequel l'unité de sélection de la station mobile (MS) reçoit une pluralité de canaux radio à liaison descendante à partir de ladite pluralité de stations de base et sélectionne un canal radio à liaison descendante qui présente une qualité de réception la meilleure immédiatement avant un intervalle de combinaison sélective courant (A ; B ; C) comme le canal radio de référence pour l'unité courante de combinaison sélective ; et

l'unité de commande de la station mobile (MS) transmet des informations de commande de puissance d'émission identiques à la totalité de

ladite pluralité des stations de base pendant l'intervalle de commande de puissance d'émission prescrit en conformité avec une qualité de réception du canal radio de référence pour l'unité courante de combinaison sélective, de sorte que chaque station de base (BS1, BS2) effectue réellement la commande de puissance d'émission pendant l'intervalle de combinaison sélective courant (A ; B ; C) en abaissant ou en élevant la puissance d'émission à liaison descendante pendant l'intervalle de commande de puissance d'émission prescrit en conformité avec des informations de commande de puissance d'émission identiques transmises à partir de la station mobile.

5

10

15

combinaison sélective courant (A ; B ; C) n'est pas un canal radio de chaque dite station de base (BS1, BS2) est rencontré consécutivement pendant un nombre prescrit de fois.

18. Système selon la revendication 11, dans lequel la station mobile (MS) inclut en outre :

une unité pour transmettre un canal radio à liaison montante contenant des informations spécifiant le canal radio de référence pour spécifier le canal radio de référence pour chaque unité de combinaison sélective ;
 et dans lequel chaque station de base (BS1, BS2) inclut :
 une unité pour juger si oui ou non le canal radio de référence pendant un intervalle de combinaison sélective courant (A ; B ; C) spécifié par les informations de spécification de canal radio de référence est un canal radio de chaque dite station de base (BS1, BS2) ou non ; et
 une unité pour transmettre des données d'émission contenues à l'intérieur de l'intervalle de combinaison sélective courant (A ; B ; C) à la station de combinaison via une ligne de transmission câblée lorsque le canal radio de référence pendant l'intervalle de combinaison sélective courant (A ; B ; C) est un canal radio de chaque dite station de base.

20

25

30

35

40

19. Système selon la revendication 18, dans lequel chaque dite station de base (BS1, BS2) ne transmet pas les données d'émission contenues à l'intérieur de l'intervalle de combinaison sélective courant (A ; B ; C) à la station de combinaison via la ligne de transmission câblée lorsque le canal radio de référence pour l'unité de courante de combinaison sélective n'est pas un canal radio de chaque dite station de base.

45

50

20. Système selon la revendication 18, dans lequel chaque dite station de base (BS1, BS2) ne transmet pas les données d'émission contenues à l'intérieur de l'intervalle de combinaison sélective courant (A ; B ; C) à la station de combinaison via la ligne de transmission câblée lorsqu'un état, dans lequel le canal radio de référence pendant l'intervalle de

55

FIG.1
PRIOR ART

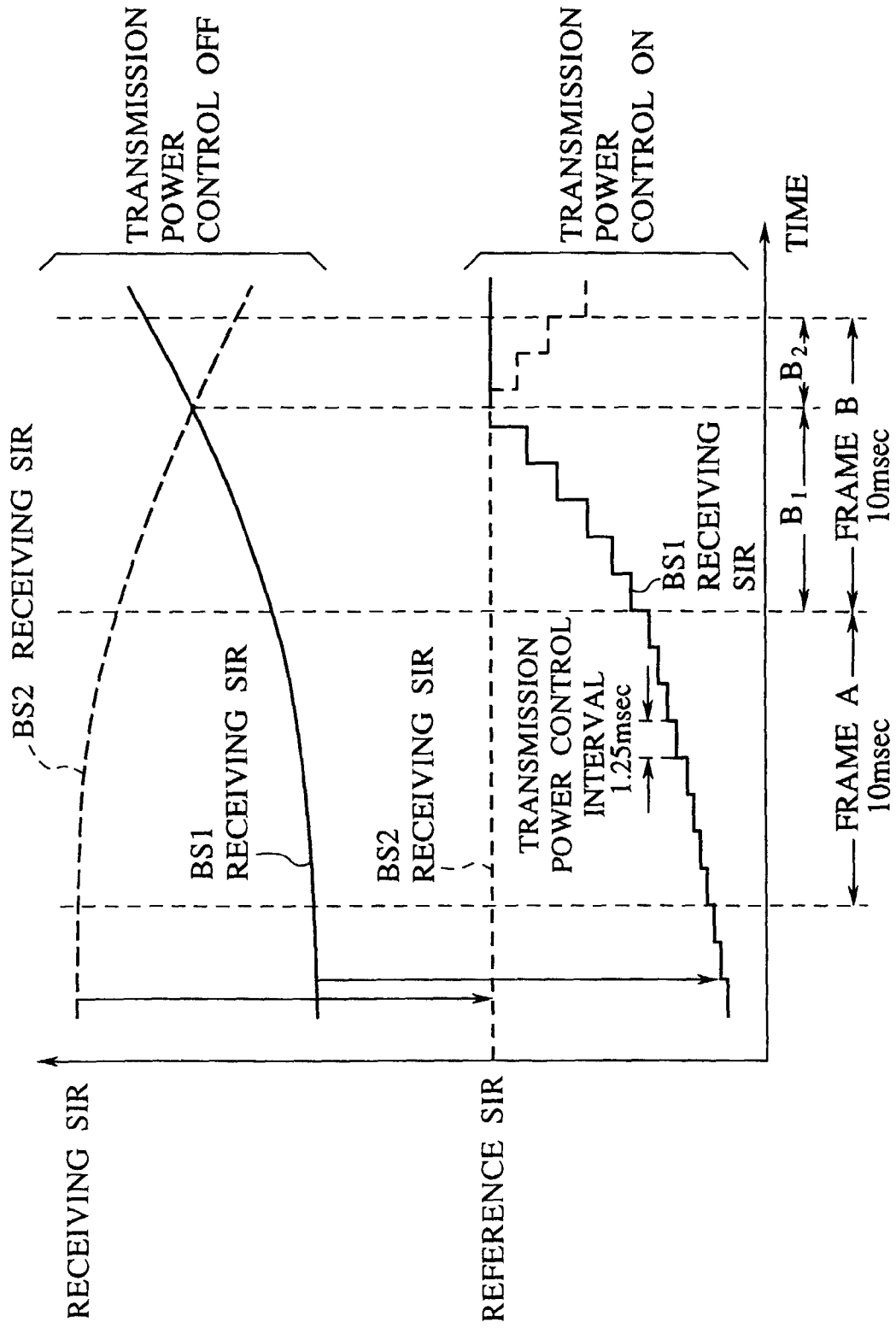


FIG.2

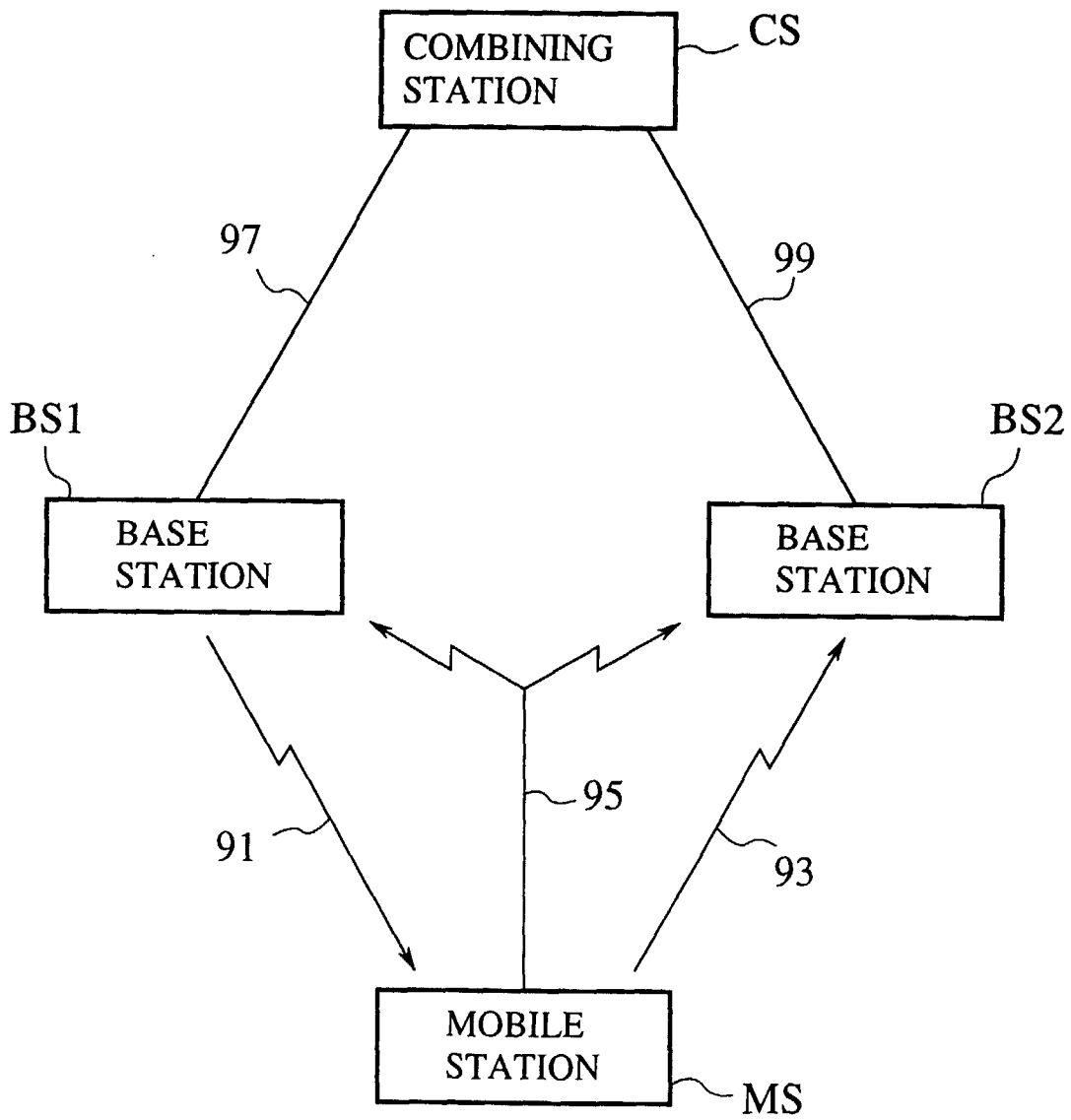


FIG.3

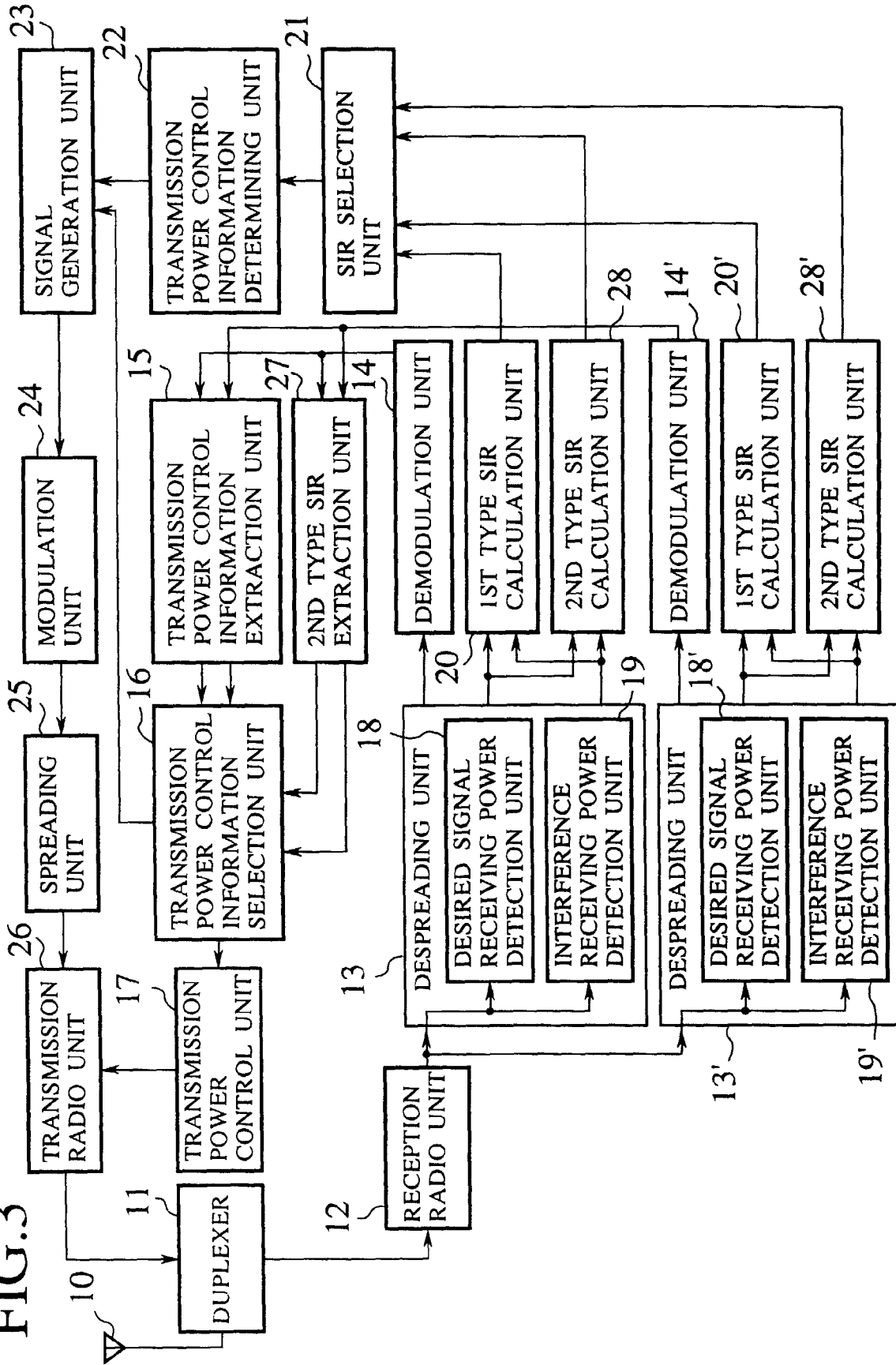


FIG.4

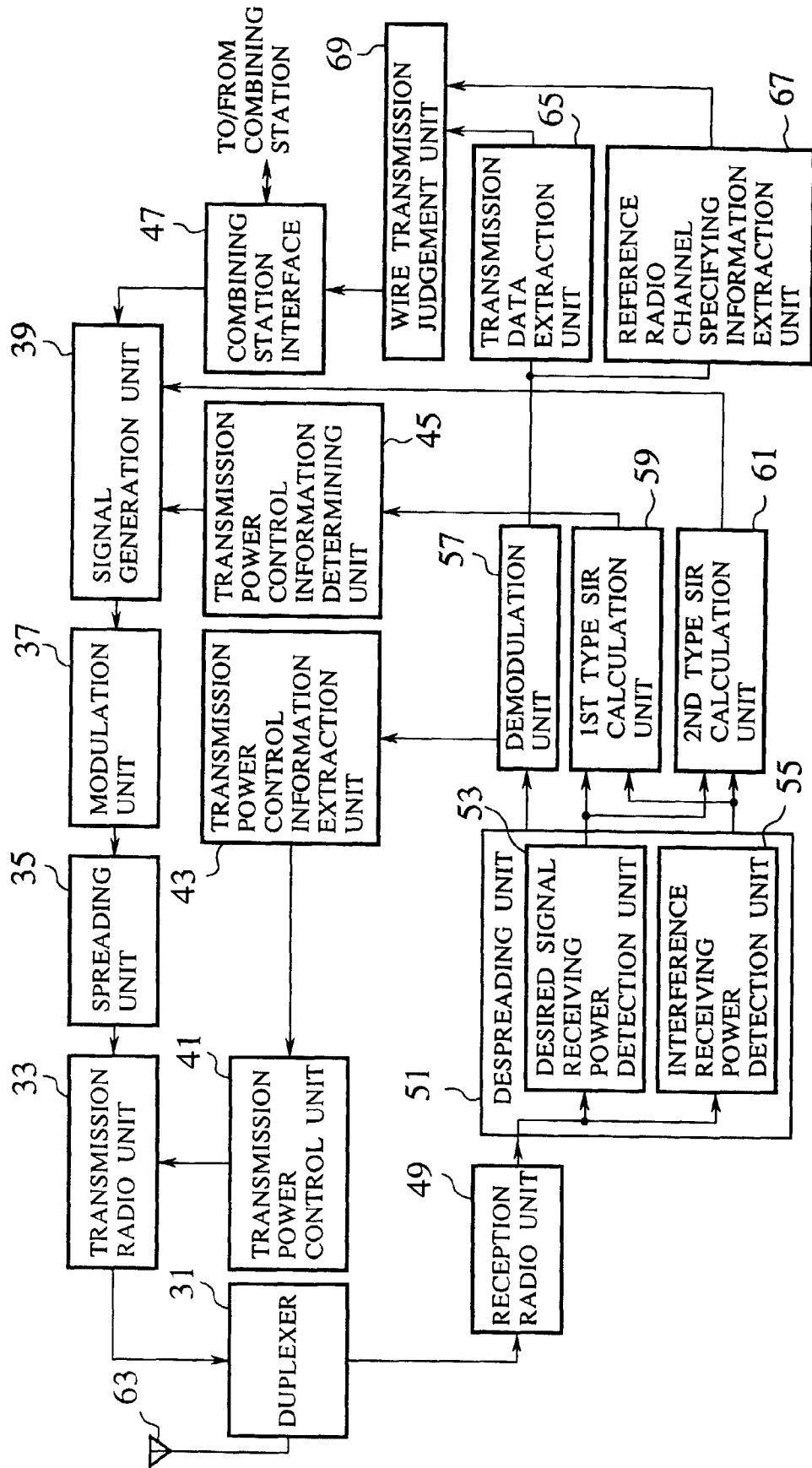


FIG.5

